

INCREASING ALGAL HARVEST EFFICIENCY BY GRAVITY SETTLING USING A TUBE SETTLER

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ABSTRACT

Wastewater treatment High Rate Algal Pond algal biomass consists of colonial algae that aggregate with bacteria to form large flocs. Large flocs have a smaller surface area to mass or volume ratio and due to their lower drag can be efficiently removed from HRAP effluent by gravity sedimentation in simple algal settling cones with a hydraulic retention time of 3 to 6 hours. This paper investigates the potential to use tube settlers to enhance algal harvest efficiency and reduce the hydraulic retention time required for harvest. The settling efficiency of tube settlers is affected by two major parameters; the angle of incline of the tube (which affects the maximum settling depth), and the flow rate (which affects the hydraulic retention time).

Tube settlers were shown to provide the same algae removal performance as settling cones which had one and a half times longer hydraulic retention time. Algae removal efficiency declined when the slope angle of the tube settler was increased from 40° to 60°, due to the increase in settling depth and increased sinking velocity required for a particle to settle during the available HRT. However, the amount of harvested algae collected in the hopper at the base of the tube settler increased due to better clearing of the solids from the tube. Tube settlers or plate settlers could provide a low cost and efficient method for harvest of algal biomass from High Rate Algal Pond effluent.

KEYWORDS

Wastewater, HRAP, Algae, Harvest, Plate / Tube Settler, Organic Loading, Slope